Set 0. Measurements

Skill 0.01: Differentiate between quantity and unit
Skill 0.02: Be able to correctly record a measurement
Skill 0.03: Understand the relationship between equipment accuracy and reported measurements.

Skill 0.01: Differentiate between quantity and unit
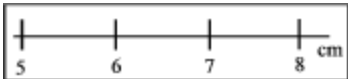
Skill 0.01 Concepts

Units describe the **quantity** being measured. Common units encountered in chemistry are shown in table 1.

Table 1. Base SI units used in chemistry

Quantity	Unit	Abbreviation
Length	Meter	m
Mass	Kilogram	kg
Time	Second	s
Temperature	Kelvin	K
Amount	Mole	mol
Pressure	Atmospheres	atm

Skill 0.01 Example 1

Identify the measuring device. Then identify the quantity (length, mass, volume, etc) and corresponding unit that could be used to describe measurements taken with the following instruments:
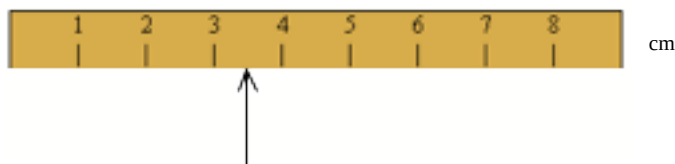
Object	Device	Quantity	Unit

Skill 0.01 Exercise 1
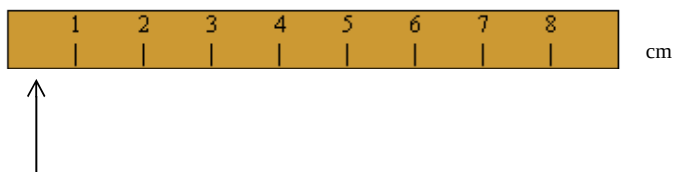
Skill 0.02 Concepts

A measurement must always reflect the accuracy of the measuring instrument.
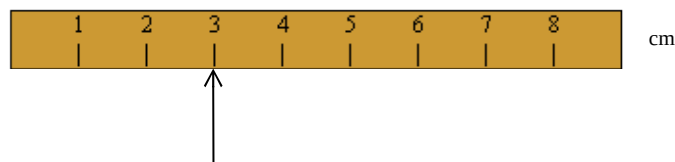
Sample 1:

You can see that the measurement is somewhere in between 3 and 4 cm. It appears to be *about* half-way and so you might record the measurement as 3.5 cm or 3.4 cm. Notice the last digit is estimated, but is still included.
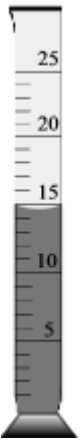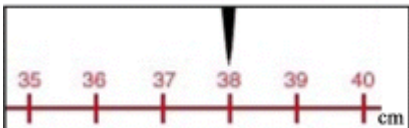
Sample 2:

This measurement is between the 0 and 1 and so you might record the measurement as 0.3 cm or 0.4 cm. Notice that in both measurements the only digit recorded is estimated.

Sample 3:

This measurement appears to be exactly on the 3. However it should be reported as 3.0 cm NOT simply 3. This is because every measurement taken with this device can be recorded to the tenths. 3.0 cm reflects the accuracy of the instrument whereas 3 does not.

Skill 0.02 Example 1

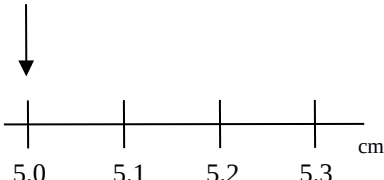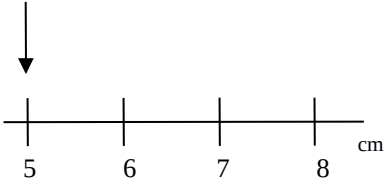| Record the measurement for each of the following (INCLUDE UNITS!)		
(a)	(b)	(c)

Skill 0.03: Understand the relationship between equipment accuracy and reported measurements.

Skill 0.03 Concepts

The number of digits in a measurement can be used to communicate information about the measuring device used to take the measurement.

Consider the two rulers shows.

A		A measurement taken with ruler A should be reported as 5.00 cm.
B		A measurement taken with ruler B should be reported as 5.0 cm.

Evaluation of the measurements indicate that ruler A provides the most accuracy. Had the 2 zeros beyond the five not been recorded on the other hand, it would have appeared that ruler B was the more accurate measuring device.

Measurement A = 5.00 cm

Measurement B = 5.0 cm

Skill 0.03 Example 1

For each data set, identify the measurement taken from the most accurate measuring device.		
(a) 1.0 g, 1.00 g, 1.000 g	(b) 12 cm, 123 cm, 1234 cm	(c) 1 g, 0.1 g, 0.01 g, 0.001 g

Skill 0.03 Exercise 1